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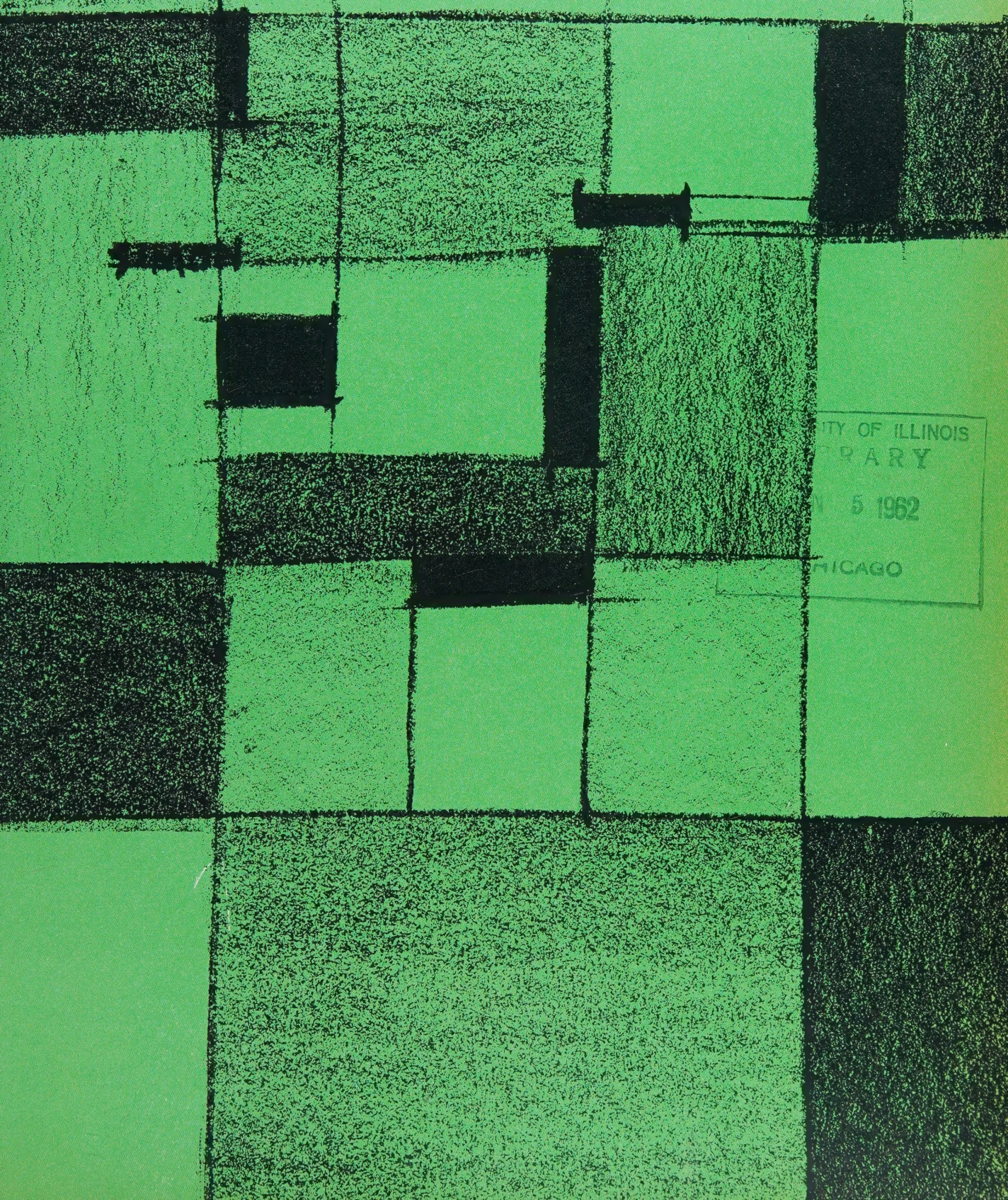

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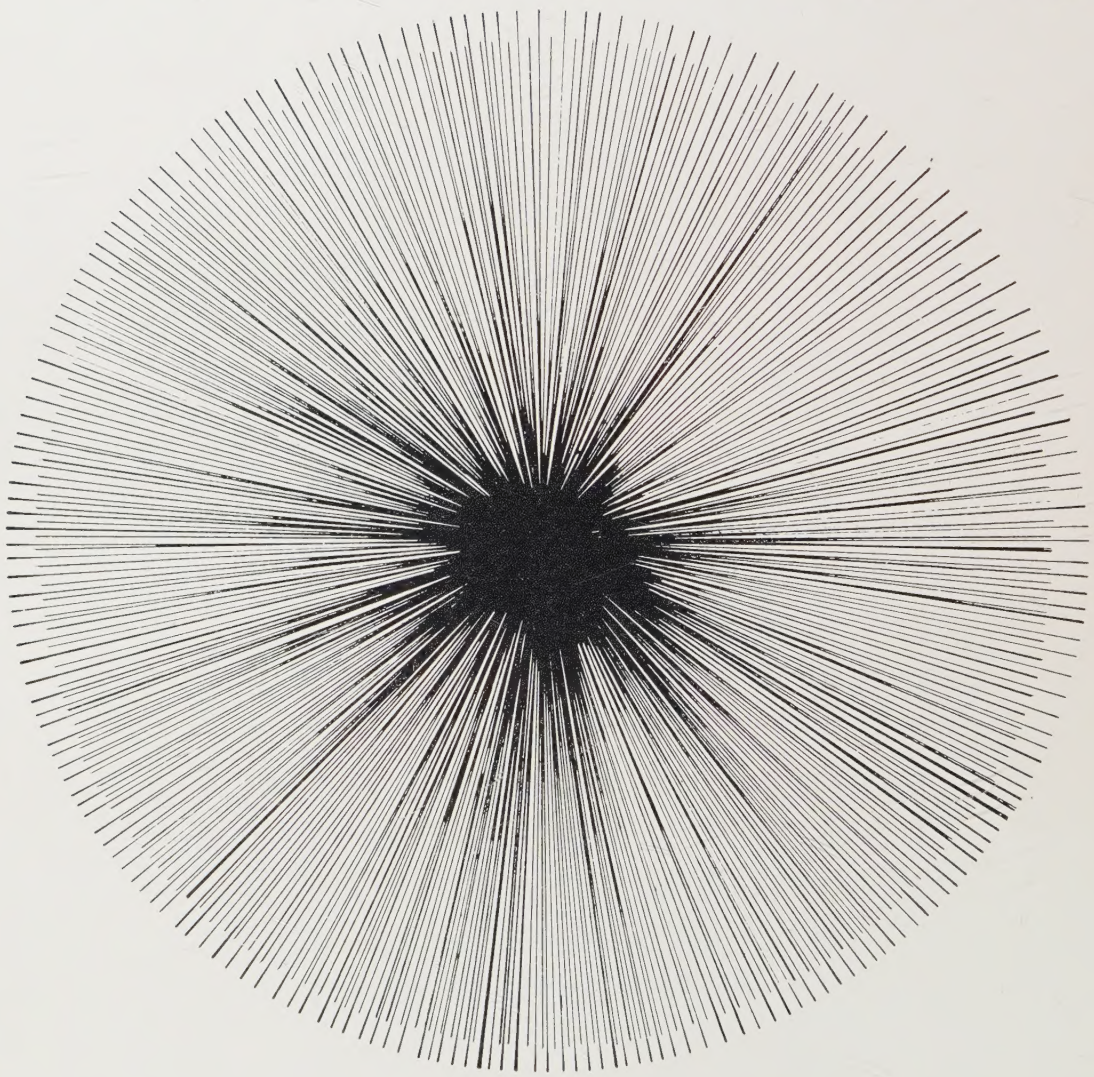

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Today's electricity is produced in some of the biggest, most ingenious and precise equipment ever built. One part . . . the turbine . . . is as big as a locomotive, revolves at the speed of sound, is so hot it glows a cherry red, and its parts fit together like a fine watch. That's today's best method, and it's gone about as far as it can go. And so Westinghouse, which builds this equipment, is experimenting with completely new methods of producing electricity. Some of them are rather exotic. One method produces electricity by shooting a stream of gas between a set of magnets. Sounds simple, but this is like handling the roaring exhaust of a rocket. The gas travels 2,000 miles an hour at 5,000 degrees F. This method is magnetohydrodynamics. Called MHD for short. It is a jawbreaker of a problem. But Westinghouse and other companies are nearing a solution. A Westinghouse MHD generator has produced electricity for 52 minutes. That's five times as long as any other has ever run. If MHD "works," we will be in a new world of electric power. Problems like this and other problems face talented scientists and engineers at Westinghouse. For information about a career with Westinghouse, an equal opportunity employer, see our representative when he visits your campus or write: L. H. Noggle, Westinghouse Educational Department, Pittsburgh 21, Pennsylvania.

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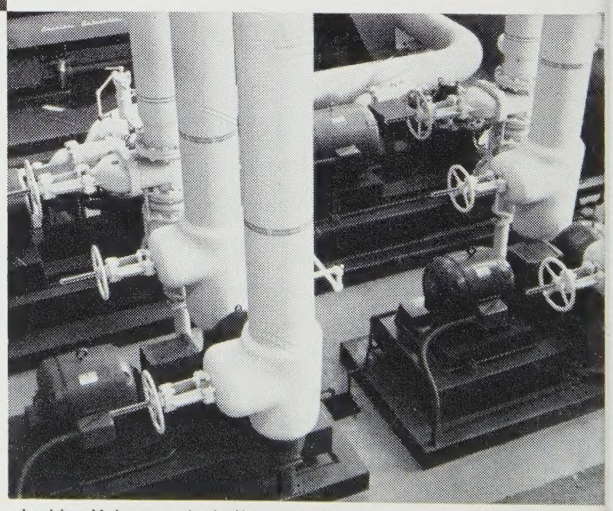

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THE ILLINOIS TECHNOGRAPH

Volume 76, Number 3 **December, 1961**

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Cover . . .

We find ourselves looking down on an abstract presentation of the new University of Illinois in Chicago. It's a cloudy day.

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• One in a series of messages on how to plan your career

Hopping or marching— two paths to a career

A career is sometimes defined as a succession of jobs, whether with a succession of employers, or within a single company.

A man is commonly said to be "hopping" when he progresses by switching from one employer to another.

The man who sticks with a single employer can be said to progress by "marching."

Marching Pays Off—There are many advantages to a one-company career. It's obvious that tenure is accompanied by status, security, and benefits that build in value as the years go by. More significant, perhaps, are the *intangibles*. You can't put a dollar value on your familiarity with the organization and the people in it. And the respect they have for you is equally important. The man who is dedicated to his employer, and confident of his ability to progress without looking afield, is free of distracting tensions, free to concentrate his full energies on the job at hand. And, especially to the family man, just "being settled" is mighty reassuring.

Finding the Right Employer — The problem facing a graduating senior is to locate a prospective employer that offers an ambitious man promising opportunities for a truly rewarding and satisfying career. The best answer we know of is to look for a company with a firm policy of "promotion from within." And a second consideration is the size and scope of the organization.

Loopers are Career Men—Every year Bethlehem Steel Company enrolls a group of graduating seniors in the Loop Course—the entire class makes an observational circuit (or "loop") of a steel plant during the basic training period. We select qualified men for the Loop Course on the basis of their potential for careers in management, and we train them accordingly. There are about 2,000 loopers on the job at Bethlehem, at all supervisory levels, and in all of our diverse operations.

The Loop Course—New loopers report to our general headquarters, in Bethlehem, Pa., usually early in July. They attend a basic course of five weeks, including lectures, classroom discussions, educational films, and daily plant visits. The Loop Course is *not* a probationary period. After completion of the course, every looper receives his first assignment. Then, after reporting to a plant, yard, or home office division, he receives further orientation before beginning on-the-job training. Bethlehem loopers embark on their careers with thorough training behind them.

Big and Diversified—Because of its size and diversity, Bethlehem Steel offers unlimited opportunities to "get ahead." One of the nation's largest industrial corporations, with over 140,000 employees, we are engaged in raw materials mining and processing; basic steelmaking and the production of a wide range of steel products; manufacturing; structural-steel fabricating and erecting; and shipbuilding and ship repair. A new centralized research facility, the Bethlehem Steel Company Homer Research Laboratories, costing in excess of $25 million, located in Bethlehem, Pa., rivals the finest in any industry.

Read Our Booklet—The eligibility requirements for the Loop Course, as well as a description of the way it operates, are more fully covered in our booklet, "Careers with Bethlehem Steel and the Loop Course." It will answer most of your questions. Copies are available in most college placement offices, or may be obtained by writing to Manager of Personnel, Bethlehem Steel Company, Bethlehem, Pa.

All qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

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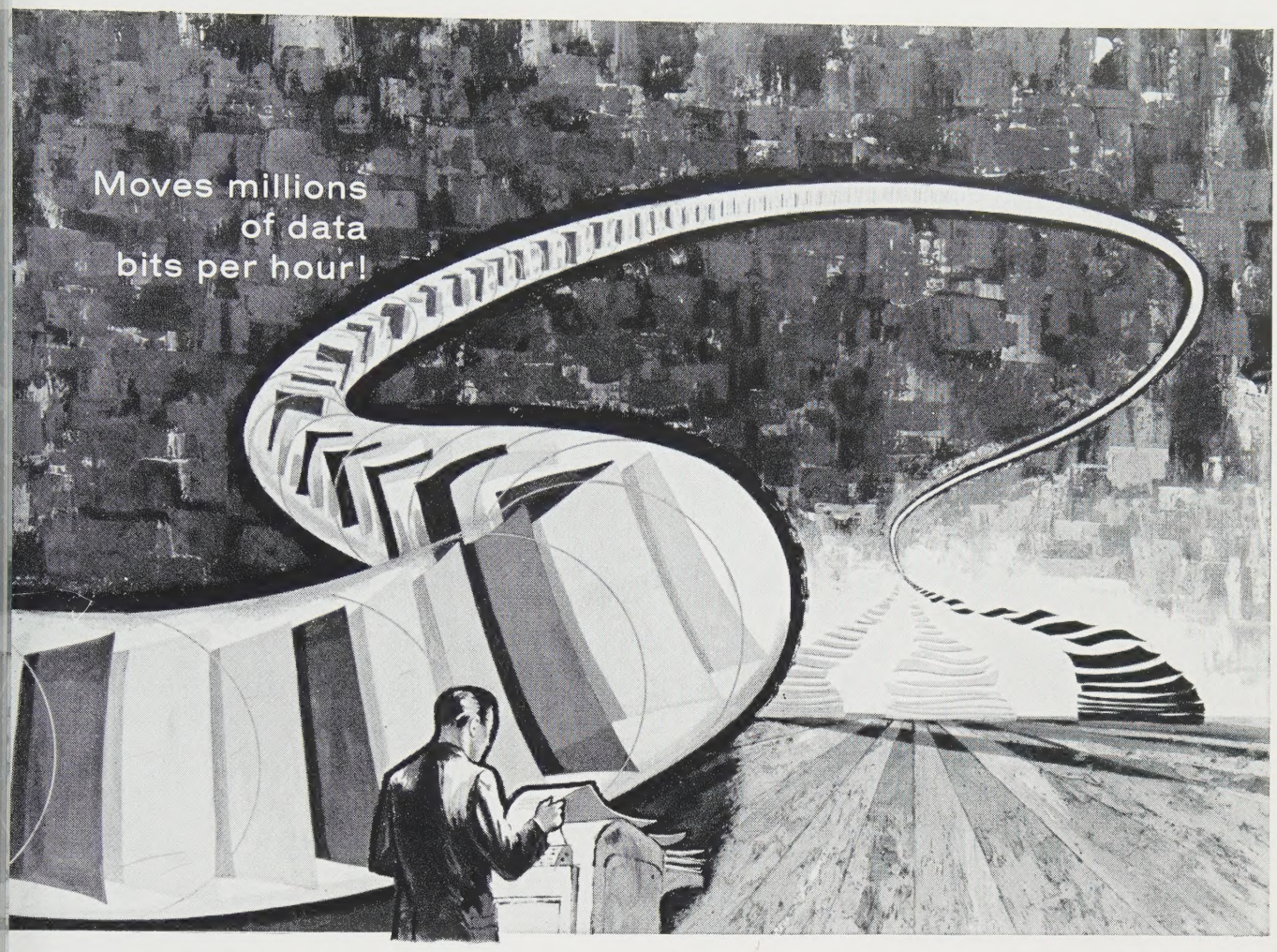

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Today, completely new concepts in communications are helping business and industry to achieve undreamed-of efficiency. Vast volumes of day-to-day correspondence and data can be sent over high-speed electronic systems linking far-flung centers into tightly synchronized operations.

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Lenkurt Electric is working in close alliance with the telephone industry, railroads, pipeline companies and electric utilities to reduce operating costs and step up efficiency with microwave and carrier communications.

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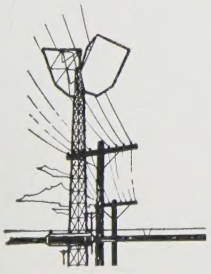

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Good reasons why I chose American Oil

by Don Anderson

"Here you're treated as an individual. The Company respects and recognizes individual achievement. The work is challenging and affords the chance to use your own ingenuity."

That's Don Anderson talking, 31-year-old mechanical engineer engaged in testing lubricants at American Oil Company. Don spent six years in the military service prior to earning his Bachelor of Science degree at the University of Illinois. Don, the father of two children, explains, "The routes to the top are many and varied. There's plenty of opportunity for advancement—and that's the best kind of job security I can think of."

The fact that American Oil attracts talented college graduates like Don Anderson may have special meaning to you as you plan your career. Don is one of many young scientists and engineers at American Oil who are growing professionally in a wide range of research projects. There are challenging opportunities in many areas. Chemists, chemical engineers, mechanical engineers, physicists, mathematicians and metallurgists can find interesting and important work in their own fields.

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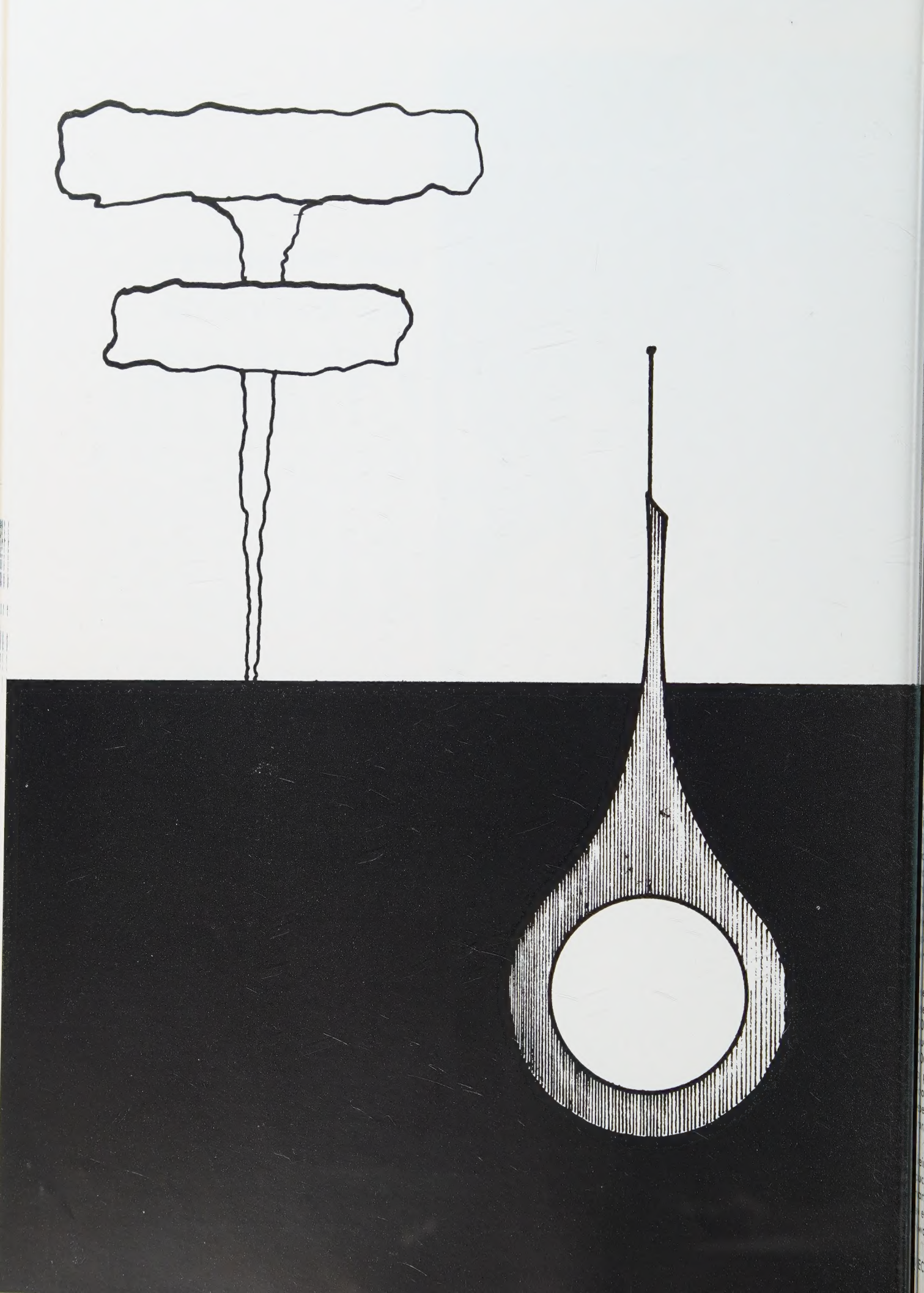


WHY BUILD SHELTERS?
FALLOUT

In September of 1961 the University of Illinois was ed by the Department of Defense to begin a series of en courses, each two weeks in length, designed to e the practicing engineer and architect an understand- of fallout shelters. The objective of this course, as far he government was concerned, was to develop the ability for analysis of existing structures to determine ether or not an existing building would make a good out shelter. As any engineer knows, a course in an- sis infers design.

The government is about to launch a full-scale pro- n of building community fall-out shelters. Both the ernment and the people of the United States are, e than ever, aware of the importance of civil defense fall-out shelters. We at the University of Illinois, in particular, in the Civil Engineering Department e long been aware of the importance of civil de- se. The University has participated in many of the lear tests conducted by the U. S. Why? To quote Mr. ley, of the Civil Engineering Department, "Recogniz- the possibility of a nuclear war, we feel we have a al obligation, as engineers, to study the problem and tect people from the effects of radiation to the best ur ability . . . it is immoral not to try to save people."

Some people attempt to detract from the importance civil defense and, in particular, fallout shelters, by ing they are a provocation to the Russians, or that out shelters are ineffective. This editorial will attempt nswer these objections.

First, let us examine the effectiveness of fall-out ters. To better understand the purpose and effective- s of shelters a basic understanding of the nature of out must be established. Fallout is of four general es These are fallback, driftout, early fallout and ld-wide fallout. Fallback consists of the heavier ma- al which falls into the crater and the immediate vi- ty of the detonation. People in this area have little nce of survival without blast shelters. The driftout y extend several cloud diameter downrange. It is erally made up of the dust particles in the stem of "mushroom" and some of the dust from the cloud. tout generally does not extend beyond the range of st damage. With adequate protection a man can sur- e in the drift-out area.

Early fallout can be protected against. It consists of finer particles that fall outside the blast area within first few days after the blast. As an example, a man miles from the point of detonation, without ade- te protection may be subjected to a lethal dose of roentgens. Even in a simple basement shelter with protection factor of 100, the total dose to which he uld be subjected, in the same period of time, is six ntgens, a dose that would not even produce a mild m of radiation sickness.

The fourth phase of fallout is what the world is ng subjected to right now, from the current Soviet lear tests. This world-wide fallout contains the fine ticles which are carried into the stratosphere to fall earth with rain or drift down towards earth continents ay from the blast. The time factor is man's best pro- ection from this fallout. The intensity of radiation de- creases exponentially with time.

If shelters are not effective, how can they be a provo- cation to the Russians? It is obvious a logical thinker can not hold the opinion that shelters are both ineffective and a provocation. The two arguments are mutually ex- clusive, and if the Russian leaders are alarmed at the American interest in defending themselves, the conclu- sion must be that shelters are effective.

Let us consider shelters as a provocation. In this sub- jective area one can only state an opinion. This editor's opinion is that a person must be quite naive to assume the Soviets do not know our intentions. The Soviets are fully aware of NATO strategy to strike only if struck first. The alarm from the eastern camp stems from the fact that the Americans are building one more strong link of defense.

Some say we must trust the Soviets. As anyone who reads a daily newspaper knows, the Russian were se- cretly preparing to test their bombs in the atmosphere while talking of a test ban treaty with delegates from the West. But mistrust of the Soviets can very easily be based on the philosophy of the Russian Communists. In the words of Lenin, a name which still remains in favor with Mr. K., "As long as capitalism and Socialism remain, we cannot live in peace. In the end one or the other will triumph—a funeral requiem will be sung either over the Soviet Republic or over world capitalism. This is a respite in war."

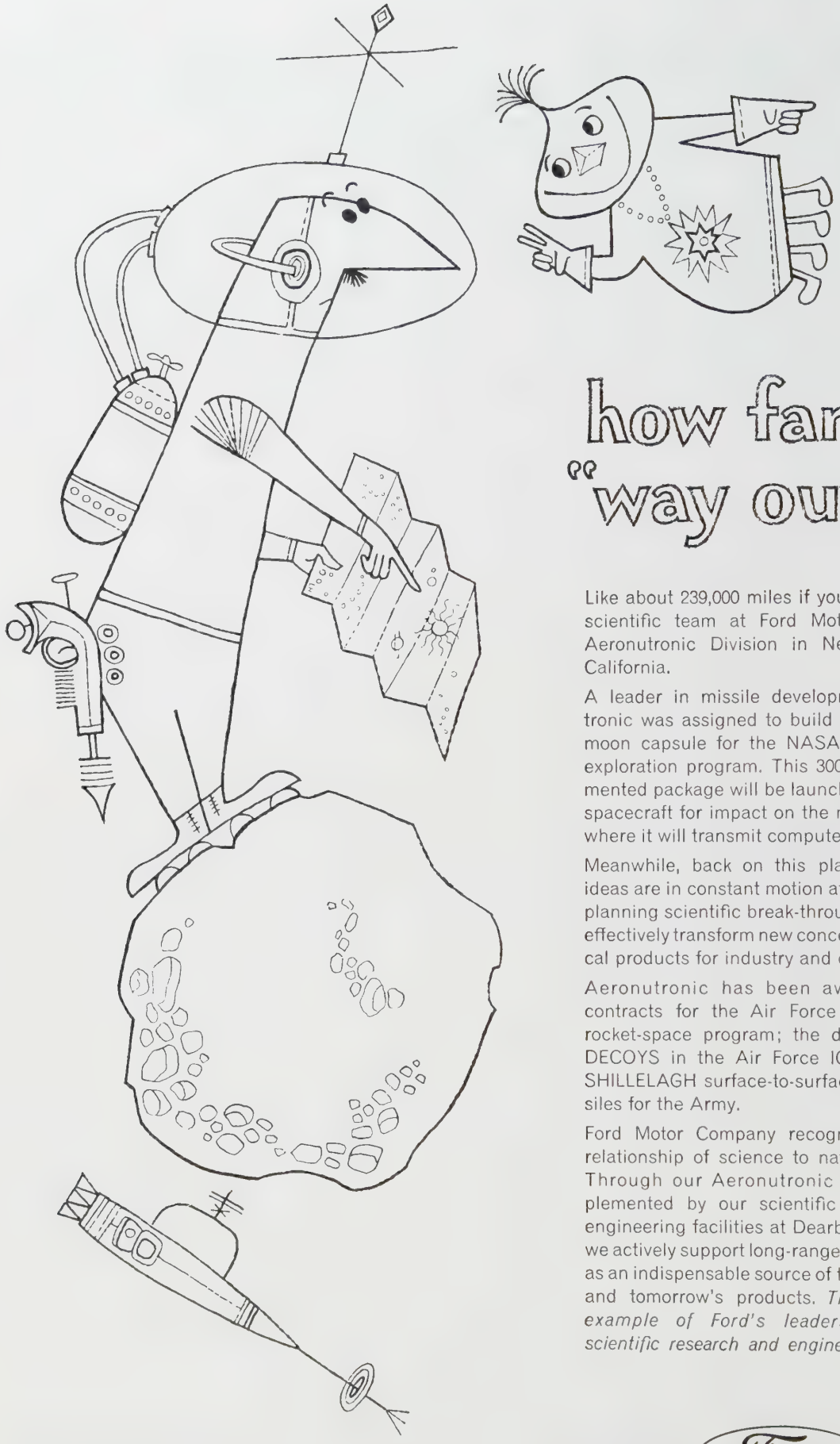
On the method of winning this death struggle, Lenin states his means when he spoke on infiltration into trade unions: "A Communist must be prepared to make every sacrifice and, if necessary, even resort to all sorts of schemes and strategems, employ illegitimate methods, conceal the truth, in order to get into the trade unions, stay there and conduct the revolutionary work within at all costs."

We will not provoke the Russian leaders. They have the initiative. We are not trying to conquer the world. If anything, we take a defensive role, striking back when already bitten.

Further objections to the construction of fallout shel- ters come from the "if everybody can't have them, let's not have any" thinkers. They insist that shelters are now a status symbol and available only to a relative few. These objections are certainly answered by the ob- jective of the before-mentioned course. Many existing buildings can provide adequate protection away from the blast area. Furthermore, each community knows the needs and financial ability of its residents (more so than the Federal Government) and could review its situation and prepare community shelters. Many home owners in a prosperous society can afford a shelter or have one constructed in his basement. We are a prosperous coun- try. We can build shelters, if not as individuals, as com- munities.

No sane man wants war. This does not guarantee the continued existence of New York, Chicago, Los An- geles, and Washington. It also does not guarantee the sanity of our opponents. Let them not catch us unpre- pared, as on the last "day of infamy."

. . . S. H. Altman



how far is "way out"?

Like about 239,000 miles if you're part of the scientific team at Ford Motor Company's Aeronutronic Division in Newport Beach, California.

A leader in missile development, Aeronutronic was assigned to build the U.S.'s first moon capsule for the NASA Ranger lunar exploration program. This 300-pound instrumented package will be launched by a larger spacecraft for impact on the moon's surface where it will transmit computer data to earth.

Meanwhile, back on this planet, men and ideas are in constant motion at Aeronutronic, planning scientific break-throughs which will effectively transform new concepts into practical products for industry and defense.

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Ford Motor Company recognizes the vital relationship of science to national security. Through our Aeronutronic Division supplemented by our scientific research and engineering facilities at Dearborn, Michigan, we actively support long-range basic research as an indispensable source of today's security and tomorrow's products. *This is another example of Ford's leadership through scientific research and engineering.*

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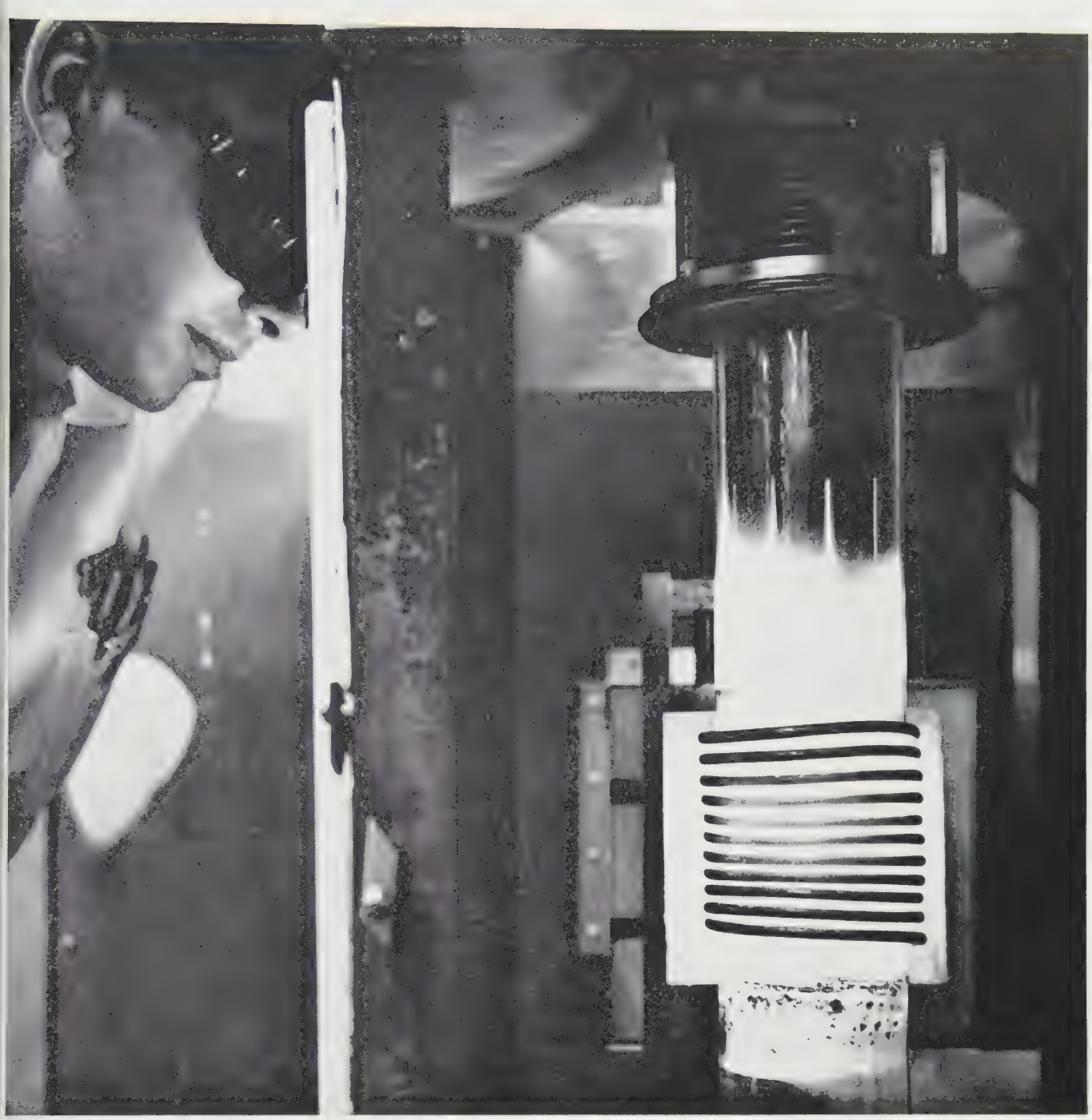

Materials for electronic "miniatures"

Monsanto . . . a world leader in chemicals, plastics and petroleum products . . . is now also a major producer of semiconductor materials including silicon, gallium arsenide, indium arsenide and indium phosphide—vital materials used in the manufacture of electronic components. Around the clock, Monsanto engineers produce these materials in a new custom-designed plant near St. Charles, Missouri.

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ALL QUALIFIED APPLICANTS WILL RECEIVE CONSIDERATION WITHOUT REGARD TO RACE, CREED, COLOR OR NATIONAL ORIGIN

John Tascher, GE '62

Russia Today....

A quick tour of some Russian cities . . . How the Houses, Factories and People Appear

Nine days is hardly time enough to pass judgment on a country as huge and complex as the USSR, but in that period I did get a glimpse of how advanced it is. It is fairly obvious even to the most casual observer that technical applications in many fields of activity are behind the times by our standards. For example, when our group drove through the new residential districts which our guide proudly showed us, it wasn't too difficult to spot ugly scars on the new buildings where bricks and tiles had fallen out of place. The bus in which we rode shook and rattled and didn't add to our enjoyment. On the other hand, some of the showplaces in the Russian capital equalled anything I've seen in Western Europe or America. In this article I will attempt to describe what I saw.

RESIDENTIAL BUILDING CONSTRUCTION

The rows and rows of impressive looking apartment buildings was our first and perhaps the most lasting impression of Moscow. These new residential sections probably reflect Russia's greatest domestic problem. Apparently the government is building these units as fast as the raw materials can be thrown together. There is no regard for quality or architectural taste. A cras program exists to provide enough hou ing for Moscow's millions.

To achieve these results, the builde seem to follow a standard constructio plan in which prefabrication is unive sal. Each building is from five to seve stories high and has, according to ou guide, 80 flats of one, two or thr rooms.

We saw buildings at all stages construction. There wasn't any ste superstructure or piles of reinforcin rods as is common in the U. S. To com pensate, greater quantities of concre are used. Walls are very thick at th base and taper off toward the top. The

This is an apartment house in the northern outskirts of Moscow. Note, the critical housing shortage shown by the shack standing next to it. The housing shortage is so critical that it cannot be hidden from the casual visitor.

sist of prefabricated sections which eared to be about 10 feet square. e walls are covered by an exterior r of a tan-colored brick. When d approximately how long it takes uild a unit, our guide said, "I can you almost exactly. It takes from e weeks to a month."

Due to the lack of a continuous l superstructure and also to the set- g of inadequate foundations, cracks developed in the walls of many dings. Often this would cause bricks tiles to fall. More often, possibly, bricks weren't put in tight enough egin with. As a result, safety net- has been installed around many of buildings at the second-floor level revent anyone from being hit by fall- debris. Even the Russians admit that buildings leave something to be de- d. According to the book, *To Mos- and Beyond*, by Harrison E. Salis- , "these buildings will constitute slums of Moscow by 1970. The chief itect calls it inexcusably bad."

Unfortunately I didn't have an op- unity to go inside any of these dings. Our hotel in Moscow, gh, was only two years old and the n and materials were similar to that he new apartment houses. I would k the apartment houses are similar le. The two steps used in coming the hotel were made of stone in h very little mortar was used. Once le the double doors, there were two and magazine counters, one to the t and one to the left. It seemed the was never there. Possibly the nters were for show purposes only, e there may not have been enough ls to be sold. To go to my room, I to the right and go down a long ious lounge to an elevator cage. A e, smoothly-working elevator takes up to the fifth floor. To get the key he room, I must go to the desk he end of the hallway. Here a wo- keeps the keys to all the rooms on floor. (In Russia, as in most other ntries of Europe, a person never s his key when he leaves the hotel.) probably won't be there, for she is lly off in some room talking with cleaning woman or someone else. It n happens that when I am in a hur- have to search the entire floor for Finally I go to the room and un- the door. The doorknob doesn't . I just push on the door and walk Most likely I will be greeted by the -brother" radio. One station plays tantly unless someone bothers to the thing off. It was on in other ns down the hall, for each room one just like it. The voice of Mos- usually plays some minutes of ic, either militaristic marches or sical. Then a commentary in which a man and woman alternate in speaking would be heard. An occasional "Amerikansky" is heard.

The rooms are comfortable and have plenty of space even though shoddy workmanship is evident. The floor boards could be lifted from the floor. They weren't nailed to the sub-flooring, probably because there wasn't enough steel for nails. Instead, the pieces fit together like a puzzle and are glued. Since there are no screens on the windows, as in most other places in Europe, the flies are a real problem. The restrooms and shower rooms leave much to be desired. The shower room, which is in the basement, has about 20 individual stalls. There is no tiling on the walls or floors, only bare concrete. I won't say much about the restrooms except that in most public buildings, such as railway stations, it isn't necessary to know the language to find them; you just follow your nose.

This was my hotel in Moscow. It isn't the best hotel in town by any means. In fact, it is better than some of the hotels I have patronized so far in Europe. But for a building only two years old, it certainly does not equal buildings in most other parts of Western Europe.

In contrast, our hotel in Leningrad on the Nevsky Prospect — the main street — was pre-revolutionary, similar in layout to many other hotels in Europe. There really wasn't much difference and it would be hard to tell whether you were in Leningrad or Paris. Most of the buildings along the Nevsky Prospect were old mansions built by the nobility of the Russian Empire. They looked to be in better condition than did many of the two year old buildings. As someone said, "The new looked old and the old looked new."

4:00 p.m. Rush hour on Nevsky Prospect, Main Street of Leningrad

TECHNOLOGICAL DISPLAYS

Another insight into the level of Soviet technology can be seen by a walk through the "Park of the Achievements of Our Economy," an exhibition of the technological developments of Soviet industry. It seemed something like a permanent World's Fair. There are pavilions for electronics, machinery, atomic energy, and others for each of the 15 Soviet republics done in the architecture characteristic of the region. First, I entered the Exhibition of Machinery Hall. Here the Russians displayed many machine tools such as lathes and milling machines. A machine that was used to measure tolerances on valves and that rejected the faulty rods into a discard can was being operated. Unfortunately for the operator, some of the rejected rods missed the discard can and dropped to the floor. It seemed as if the machine timing could have been improved. Nearby, a ball-bearing machine was being demonstrated. It seemed to work pretty well and it had won first prize. There were trucks on display outside the Machinery Hall; some of them, according to a fellow tour member, closely resembled International Harvester models.

Next came the Atomic Energy exhibit. Most of the displays were stale—cosmic ray counters and charts explaining nuclear fission—such as could be seen all over Europe and America. One booth was interesting though. This contained two remote control hands which could handle radioactive material with great dexterity. These "hot" materials could be poured from one test tube to another with ease by the operator who stood behind thick glass. Another interesting device was a radioactive contamination detector. Workers who handle

radioactive materials step into this booth before leaving a factory to check to see if they have dangerous doses of radioactivity in their clothing. Both of these devices exist in the United States.

We then spent a few minutes at the Electronics Exhibit. The color TV display was not ready yet. They proudly showed the 1950 model TV sets. Crowds gathered around a tape recorder which was playing back a speech. I didn't spend much time at this exhibit, but noted no transistor radio sets or other electronic consumer luxuries. For a country that has perhaps the most advanced rockets in the world, these displays were rather un-imposing.

A FACTORY VISIT

Once I had seen some results of Soviet technology, I wanted to visit a factory and see actual production, perhaps an auto assembly plant or, if possible, a steel mill. Helene, the guide, said she would go to the Intourist office and see what could be arranged. She returned later to tell my companions and I that it was possible to visit a watch factory. So, on this last morning in Moscow, we drove across town to the five-story prerevolutionary building. Before touring, a short introductory talk was given by one of the technical managers, while Helene translated. He said that the factory produces three milloin watches a year, employs 7,500 workers, of whom 75 per cent are women. and that the workmanship is equal to that found in Switzerland, France, or anywhere else. He commented that this plant is only 30 years old while similar plants in other countries have been working for two or three hundred years. The manager then said, "By the expression of your faces, some of you don't seem to believe me. But in a few minutes when I take you around, you'll see what I mean."

He spent about an hour and a half with us. First, we saw an assembly line. All the workers were women, most of them young, from 18 to 25 years of age. They sat along both sides of long tables. A conveyor carried the watch casings along slowly and the worker would place a few gears or screws before it moved along the line to the next operator. Her tools consisted of tweezers, small screwdrivers, an optical device to go over one eye such as the local watch repairman uses, and a pair of very steady hands. When asked about this. the manager said that the close work didn't harm their eyes until they became about 40 years old and at this time they would be transferred to other jobs. One member of our tour then chuckled and said, "Yes, they are transferred to sweeping the streets." This was not meant to be funny. Many women do work at such hard-labor jobs as painting buildings (in either pink, a light green,

Palace "Peterhof" near Leningrad. Summer residence of the Czar.

or a sickly looking yellow, the only three colors for buildings I've seen in Russia), plastering, digging, and doing street repairs.

At the factory we were also shown recently installed automatic forming machinery which makes springs, spindles, axles, small watch gears, and other small parts. They were complex machines and seemed to be in good working order. Many could be tended by one person. There was a section of the factory where parts are punched out by stamping machines. Here they still use conventional machinery which, the manager said, is to be replaced by automatic machinery sometime this fall. We saw an ultrasound cleaning device that "shakes" loose the lubricant and small particles from the parts produced by the forming and stamping machines.

Several men operated an oscilloscope or electronic device which checked to see if the watch was running too fast or too slow. It seemed that a correct, standard timing device caused a wave form and then the tick-tock of the watch to be tested caused another wave on the scope. If the waves were synchronized, the timing was okay. Several men ran this operation.

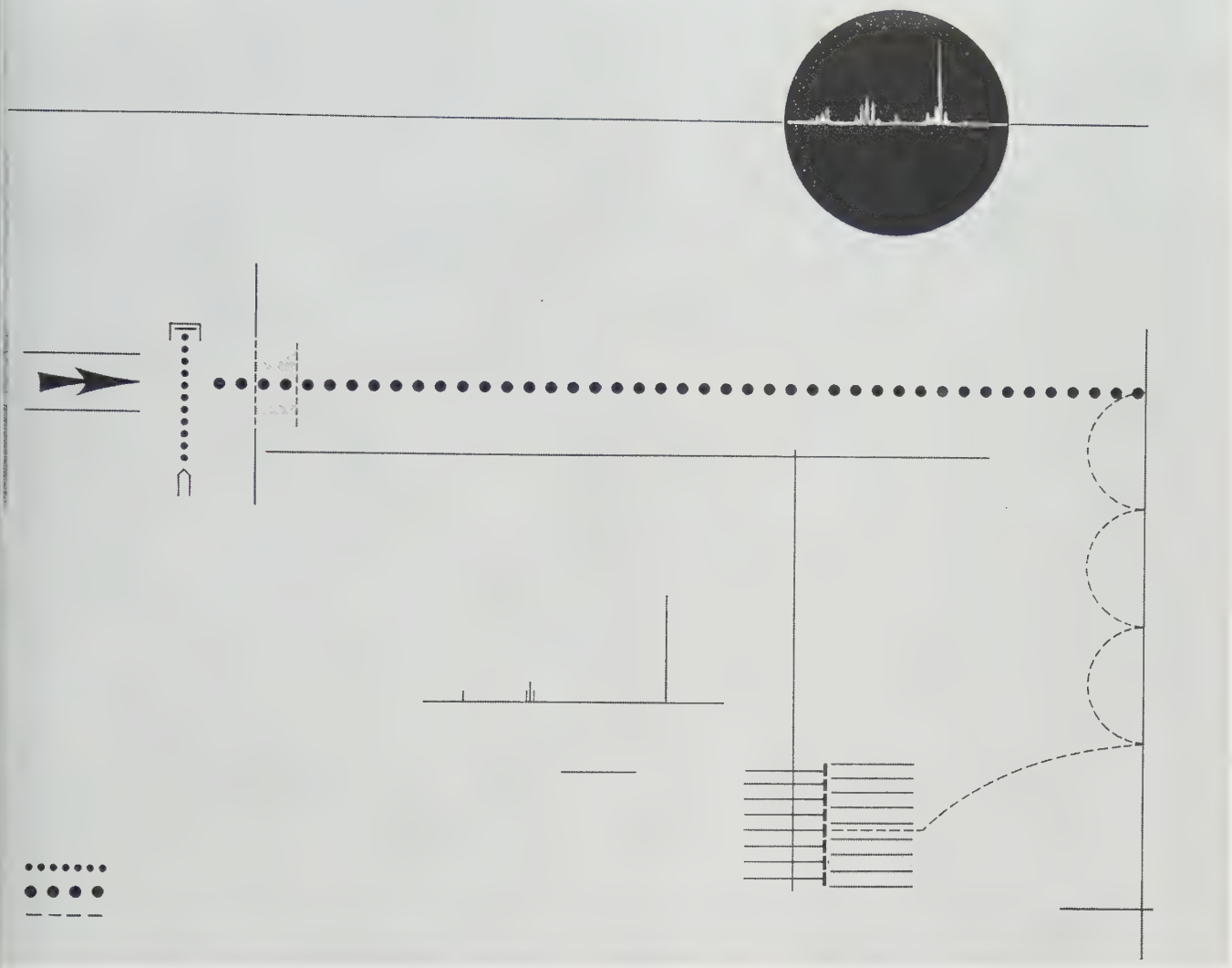
In contrast, the plant layout seemed like a relic of 1890. There were no elevators for personnel use, the lighting was very poor. Each assembly worker had an individual fluorescent tube above her work; there was no other lighting except that from the windows. Bare electric wires were exposed near the switch boxes. and the overall decor was colorless. There were many pictures of government and party officials, along with the inevitable of Lenin smiling benevolently down to the workers. Of course, there were pictures of the "workers of the week" displayed in prominent places. These people have been i highest in unit production during t previous week and are accorded hi honors and usually get a reward su as higher pay, a better job, access to b ter living quarters, or some such capita istic incentive.

After the tour we were taken ba to the reception room where we cou look at some of the watches produc and could ask questions. We found o that the average worker makes 90-1 rubles a month (based on the tour exchange rate, 0.90 rubles equals a d lar). The chief technical man mak 275 rubles a month and the head the factory 350. The work period seven hours a day, five days a week. T manager went on to say that facto heads and planners did not have to members of the Communist Party, b that they usually are. He himself w a member. When asked who wasn't member, he said triumphantly that t chief technical manager wasn't. Wh asked about labor relations he said t unruly or uncooperative workers counciled and usually go back to th job in the right spirit. Although didn't say what happened to them, t manager commented that only one m in the history of the factory had b fired.

Different watches in two display ca were passed around at this time. M were heavy and bulky compared to ou The ladies' watches were not the fi precision types seen elsewhere. I saw expansion bands. The bands were eit leather or solid pieces of metal stamp onto the watch. None of them w working. A friend wound up a poc watch and tried to get it going. T winding was heard all over the ro but the watch wouldn't go. He

(Continued on Page 26, Col. 1)

BENDIX IN SCIENCE AND ENGINEERING



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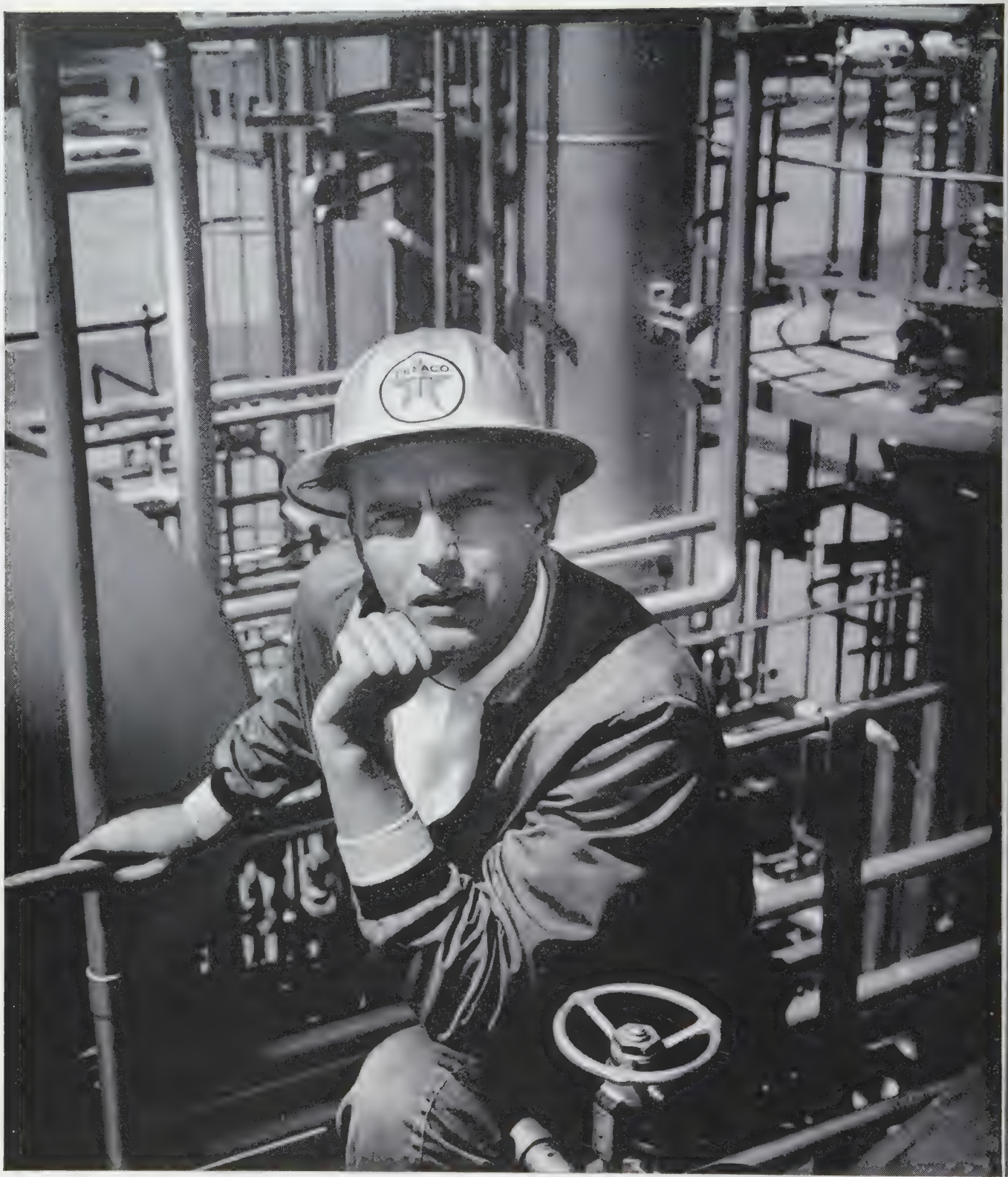

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John M. Shephard, ME '65

"To Be or Not To Be" and the computer.....

Something New is Being Done With Man's Closest Intellectual Competitor . . . Hamlet May Have A New Ophelia

With the advent of electronic com-ers an entire new race of "mechan-men" have taken over the headlines. e of the latest and most unusual of "human simulating machines" was oduced by Bell Telephone Labora-es. On May 10, 1961, the Acousti-Society of America was given a non-tal reading of the immortal words Shakespeare. They heard a tape re-ding of an electronic computer re-ng the famous "To Be or Not To soliloquy from Hamlet. Of course, far as the computer was concerned, e or not to be alive was not the ques-. It had merely synthesized the ch from instructions fed to it on ched cards by Doctors John L. Kel-Jr. and Louis J. Gerstman.

Dr. Kelly demonstrated several sam-of synthetic speech and explained they were produced during a re-ch experiment at his laboratories for purpose of obtaining a better under-nding of the nature of speech.

The computer accepts, on a sequence punched cards the names of phonetic bols which make up an English sen-ce. It processes this information and thesizes speech which is intelligible, ough slightly "mechanical" in qual-With further refinements of their nputer program, Kelly and Gerstman expect to obtain more human-like speech. Eventually they hope to be able to imitate the voices of specific persons in their simulated speaking machine.

The machine also sings. Dr. Gerstman played a tape of a baritone voice singing a verse of "Bicycle Built For Two." The song was also generated in the computer. The words are quite intelligible and, what's more, the notes are exactly on pitch.

Although actors and entertainers need not fear being superceded by the talents of the computer, the electronic-brain may be extremely helpful to the perfection of a performance of a vocalist. If the computer can be perfected to the point of perfectly generating the human voice, a vocalist may use the computer's voice as a model. The vocalist may insert the cards for a particular song into the computer, as the computer produces the song, a perfect model of the song for the vocalist will be produced. The computer's voice would then be put on tape for future reference of the vocalists. He would then have a perfect recording of the song so he may study and analyze it to perfect his own performances. Due to the high hourly cost and the fact that it takes up to 25 minutes of computer time to produce one minute of synthetic speech or song, the entertainment field is reasonably safe from being overthrown by the computer.

Dr. Kelly explained that current research in speech synthesis has been undertaken to seek new knowledge which will be useful in devising ways of transmitting the essential information contained in speech more efficiently over communication systems. At the present rate, it may be only a short time before new realms of communication systems have replaced the current methods.

Another application of the computer may be in the business world. An executive in New York may have a business letter for some concern in San Diego typed. Immediately the computer in San Diego is activated and the voice of the sender in New York will be simulated by the computer in San Diego. In this way, ideas will be expressed in a more comprehendable manner and time will be saved. It may even be possible to carry on a two-way conversation with a permanent record of the conversation available for future reference. In this way, business transactions will be speeded up to several times the present pace.

The advent of a computer capable of duplicating human speech to the point of being indistinguishable from the normal speaking tones of the human voice will greatly increase the educational opportunities of the handicapped. There are numerous ways the computer could increase the education of the blind. A blind person may be able to have this computer read books to him which previously been encoded on punched cards. He will be able to comprehend in a more natural manner the troubles that face the world today.

In the educational fiield, the computer may find itself being used as the teacher of any number of subjects. It will not only be able to teach the prepared lesson for the day, but will be able to answer questions fed to it by the students themselves.

Indubitably there will be other applications, however, at present, Kelly and Gerstman are concerned with the basic fundamentals. They are analyzing speech and breaking it down to its raw elements. They feel that when they can combine the elements into synthetic speech and make it indistinguishable from human speech, they will have come a long way toward understanding the nature of speech.

So they are continuing to experiment, to modify their computer programs, and to make the computer speak, recite and sing. And since everything which comes out of the computer is specified by the instructions they program into it, the computer has one advantage over human beings—when called upon to "say a few words," the computer, at least, doesn't worry over what it should say.

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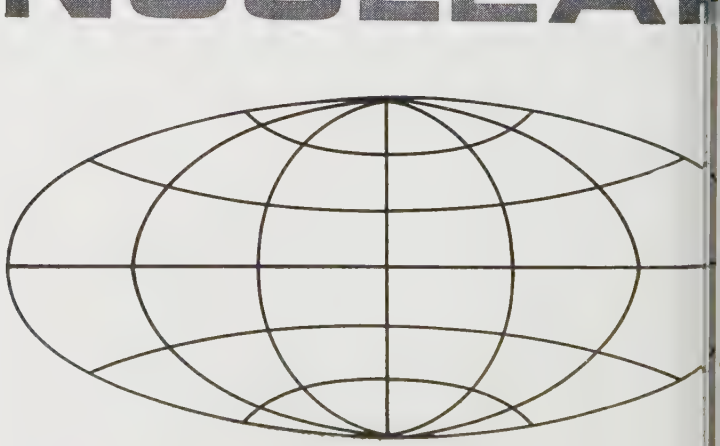

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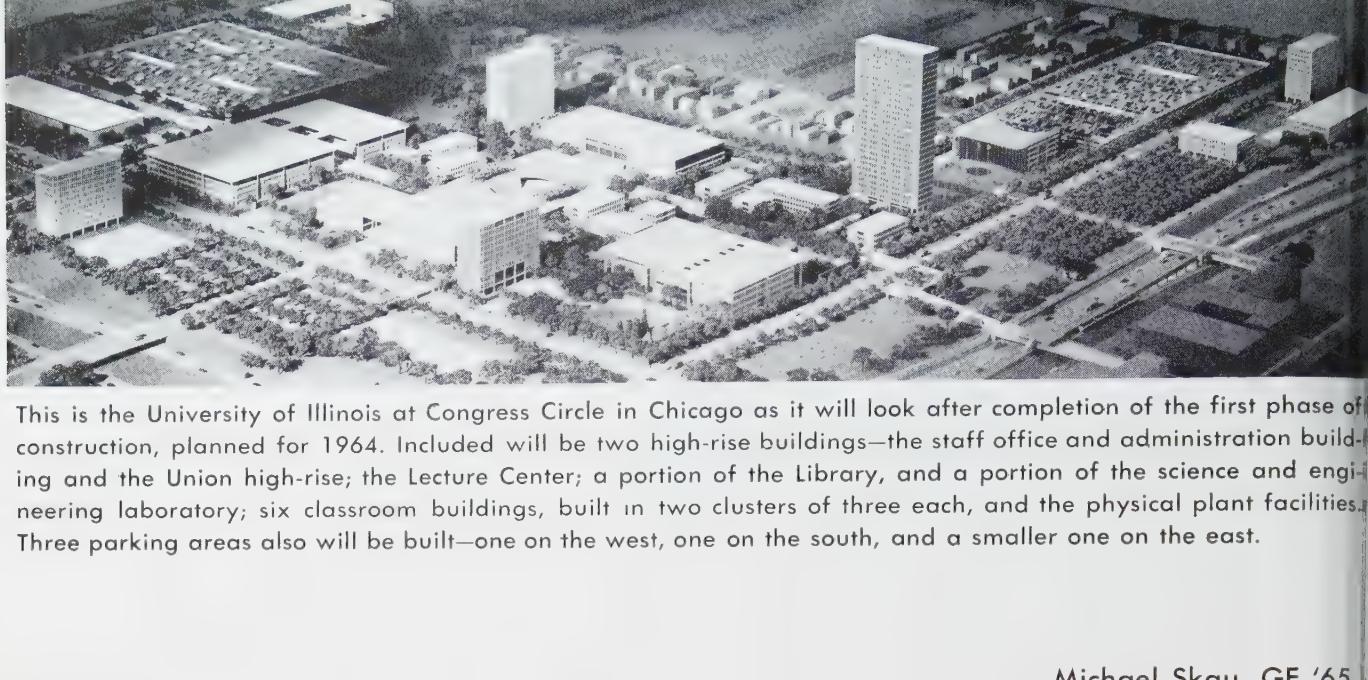

This is the University of Illinois at Congress Circle in Chicago as it will look after completion of the first phase of construction, planned for 1964. Included will be two high-rise buildings—the staff office and administration building and the Union high-rise; the Lecture Center; a portion of the Library, and a portion of the science and engineering laboratory; six classroom buildings, built in two clusters of three each, and the physical plant facilities. Three parking areas also will be built—one on the west, one on the south, and a smaller one on the east.

Michael Skau, GE '65

Navy Pier's Replacement

A Report of the University of Illinois' New Campus in Chicago

On September 1, 1961, the proposed master plan for the new campus of the University of Illinois at Congress Circle, Chicago, was revealed at a meeting of state and city officials, members of the Illinois General Assembly, the University's Board of Trustees, and other community leaders.

The educational program now being offered in temporary facilities of the Chicago Undergraduate Division on Navy Pier will be transferred to the new campus and will be the basis for expansion into a full four year, degree granting program.

The primary mission of the expanded Chicago Division will be to meet the pressing needs and demands created by population increases and by rising proportion of high school graduates seeking admission to college.

Military Science (ROTC) will be offered on a voluntary basis. The proposed student Union Building will be devoted to recreational facilities in such activities as swimming, tennis, handball, archery and bowling.

The campus is compact, and will be, therefore, one of the most intensively developed among universities in the United States. Thus, buildings are being designed to serve a function rather than a discipline. With this in mind, classroom buildings are designed. In an urban community, and on a site as compact as Congress Circle, the use of high-rise structures, when feasible, is sound economically.

Also planned is an "express walkway' which will connect most buildings on the campus at the second-story level, either directly or through tributary sidewalks. This walkway will be free of all but pedestrian traffic.

A similar walkway will connect the student union on the east side of the campus with the Library on the west, with the two walkways meeting at the "Great Court" in the center of the campus.

The "Great Court" — actually the roof of the lecture center in the center of the campus—is another major feature of the master plan.

The campus plan is designed to meet the needs of today and tomorrow. It not only incorporates the educational traditions of the past—it has also been shaped by the factors of the existing site, educational program, staging requirements, aesthetics, and economics. It embodies a modern conception of efficient space utilization, getting the most f the construction and maintenance lar, and planning for the future.

Construction, as set forth in the ter plan, is divided into three parts, representing a phase determined by rollment projections and educati programs required.

The first phase is to be complete the fall of 1964 for an enrollmen 9,000 students, with most advanced dergraduate work restricted to the leges of Liberal Arts and Sciences, Commerce and Business Administra

The second phase is scheduled completion by the fall of 1969 an planned for an enrollment of 20 students in a full four year, de granting institution.

The third phase, scheduled for struction probably after 1969 inc auxiliary buildings, graduate, rese and service structures, and facilitie other aspects of the program to be a after that date.

This campus plan will become a bol of the Land Grant College and university expressing the basic osophy of broad educational opport and reflecting the spirit of a ci state, and a nation.

he center of the campus of the University of Illinois at Congress Circle, re the most intensively used facilities will be located, will be "The at Court," actually the roof of the Lecture Center. The four large lecture ns in the Center are expressd on the Court by four circular areas paved ontrasting materials. The Court will connect with the express walkway ng the north and south sides of the campus, and with the Union and ary, shown in the above photograph to the left and right of the Great rt respectively.

outstanding features of the University of Illinois at Congress Circle are vn in this photograph. The staff office and administration building, on left, will be the tallest building on the campus—28 stories. It is to be by September 1964 in the first phase. On the right is the Auditorium, duled for construction some time after 1969, depending on the avail- ty of funds. Design plans call for it to have a curved roof and walls.

Condemn Some Job "Offering" Techniques

Industrial firms are practically unanimous in condemning present campus recruiting techniques for being too costly and for giving students an inflated picture of their own value. But they are also afraid to do anything about it.

A recent *Wall Street Journal* survey brings out industry worries and uncovers instances of questionable practices in the quest for talented graduates.

Principal complaint of industrial recruiters is that they must either compete tooth and nail in expensive, snowballing recruiting programs, or else stand by and watch their less conservative competitors grab off the top graduates. In addition, corporate bowing and scraping makes students big-headed and easily disillusioned when confronted with industrial facts of life, report companies. To stop all this, many recruiting officials would like to scale down some of their operations, provided, naturally, that their competitors do likewise.

From another quarter come other complaints: To get what they want, companies indulge in highly questionable practices, say college placement directors. Not only do recruiters try to circumvent authorized student-contact channels, but they use corporate contributions to schools as a weapon to get preferred interview scheduling and advance lists of student names and qualifications.

On the other hand, company recruiters accuse college placement directors of playing "little tin god" and of forcing unreasonable restrictions upon their movements and tactics. Placement officers should be more interested in seeing their students get good jobs and less interested in inflating their own positions, say the recruiters.

To bring the system back to earth again, the General Council of the American Society of Engineering Education recently approved a set of "Principles and Practices of College Recruiting," which clarify the responsibilities of the recruiter, the college, and the student. These rules, it is hoped, will provide the student with the objective atmosphere he needs to make a valid career choice by encouraging the full disclosure of all pertinent facts surrounding offers of employment, while at the same time assuring equal treatment for all prospective employers.

THE DEAN'S PAGE . . .

+ ENGINEERING PLUS +

By Dean H. L. Wakeland

As our great American economy has developed from a relatively single system into its present complex form, the role of the practicing engineer has also changed. He is not concerned with construction only. Today he is concerned with automation and its implications to society where yesterday he may have been concerned with only automation. Today his knowledge is needed in medicine, commerce, agriculture, psychology, education and life sciences where a few decades ago he was concerned primarily with buildings, bridges, power and machines as related directly to industry. He is expected to have knowledge of finance, economics, sociology, psychology, logic, astronomy and in many cases specific knowledge, as well as the engineering "know-how" of his predecessors.

Engineering educators now encourage their students to take a broader range of subjects and specifically urge students to include more social sciences and humanities than in the past. It is impossible, though, to expect every graduate engineer to have knowledge in all these areas. As the variety of fields of engineering application has continued to increase, a variety of inter-disciplinary studies have been developed to meet the demand. One of the first inter-disciplinary needs to be recognized was that of a patent attorney which combined the fields of engineering and law. Another popular combination is Engineering Administration, combining engineering and commerce. Areas of employment where the fundamentals of engineering are needed plus an additional field of knowledge are sometimes referred to as the "Engineering Plus" areas.

Some of the "Engineering Plus" programs that have been taken by engineering students at the University of Illinois are herein briefly described to illustrate possible combinations.

5-Year Engineering-Liberal Arts and Sciences Program

This is probably the most popular "Engineering Plus" program. Industry, business, and government in recent years have continually emphasized a need for men and women having a thorough technical training combined with a well-rounded cultural education. Graduates of this program are well qualified for responsible positions in industry, business, or government.

The program permits a student to earn a Bachelor of Science Degree in some branch of Engineering and a Bachelor of Arts Degree with a major in some liberal arts study area within five years. If the entire program is completed at the University of Illinois, a student may earn a degree in any of the fields of engineering offered by the College of Engineering, except Engineering Physics, and at the same time major in one of the following Liberal Arts & Sciences study areas: anthropology, classics, English, French, history, German, Latin, mathematics, philosophy, political science, psychology, Russian, sociology, Spanish or speech. A comprehensive outline of this program is given in the University of Illinois Undergraduate Study Bulletin.

The University of Illinois College of Engineering also has agreements with several liberal arts colleges whereby students may obtain a bachelor's degree in liberal arts from the liberal arts college and an engineering degree from the University of Illinois. In general, students in this combination spend three years at the liberal arts college and two to two and one-half years at the University of Illinois.

Colleges affiliated with the College of Engineering are; Colorado College, Colorado Springs, Colorado; Greenville College, Greenville, Illinois; Saint Joseph's College, Collegeville, Indiana; MacMurray College, Jacksonville, Illinois; Rockford College, Rockford, Illinois; Western Illinois University, Macomb, Illinois; and Carthage College, Carthage, Illinois.

Engineering-Business Administration

In recent years there has been a national trend to appoint an increasingly larger number of engineers to industrial administrative positions, and presently nearly 40% of all industrial executives are engineers. In these positions, engineers deal more with human proble and business decisions than with dir technical activities. Two types of p grams at the University of Illinois m the needs of engineers planning to w in administrative areas.

A student eligible to enter gradu school (he must have a 3:5 average better) may enter graduate studies Commerce and Business Administrat upon completion of a Bachelors Deg in Engineering. He may then compl a Master's Degree in Commerce in additional year provided he has the quired undergraduate prerequisites he may complete the Master's Degre Business Administration in two ad tional years.

If students intend to receive the M ter's Degree in Commerce in one ad tional year, they should have at l 20 hours of under-graduate credit business. These twenty hours of und graduate credits should include a b course in Principles of Economics, F damentals of Accounting, Fundamen of Management, Principles of Sa and nine additional semester hours work in undergraduate studies in field of intended graduate study. A cific major area of graduate study n be selected in the Master's Degree Commerce program such as Man ment, Marketing, or Accountancy the program is more confining on graduate level than the one leading a Master's Degree in Business Ad istration.

No special undergraduate prep tion is required of engineering stud wishing to enter the program fo Master's Degree in Business Adm tration, although fundamental co in economics and accountancy are h ful. This two year graduate prog covers a wide range of commerce st and fully prepares students to ente field of Business Administration. M keting, management, accountancy, s finance and business administra studies are combined in this two program to provide a sound backgr for administrative employment. A cants must have a 3.5 average or b

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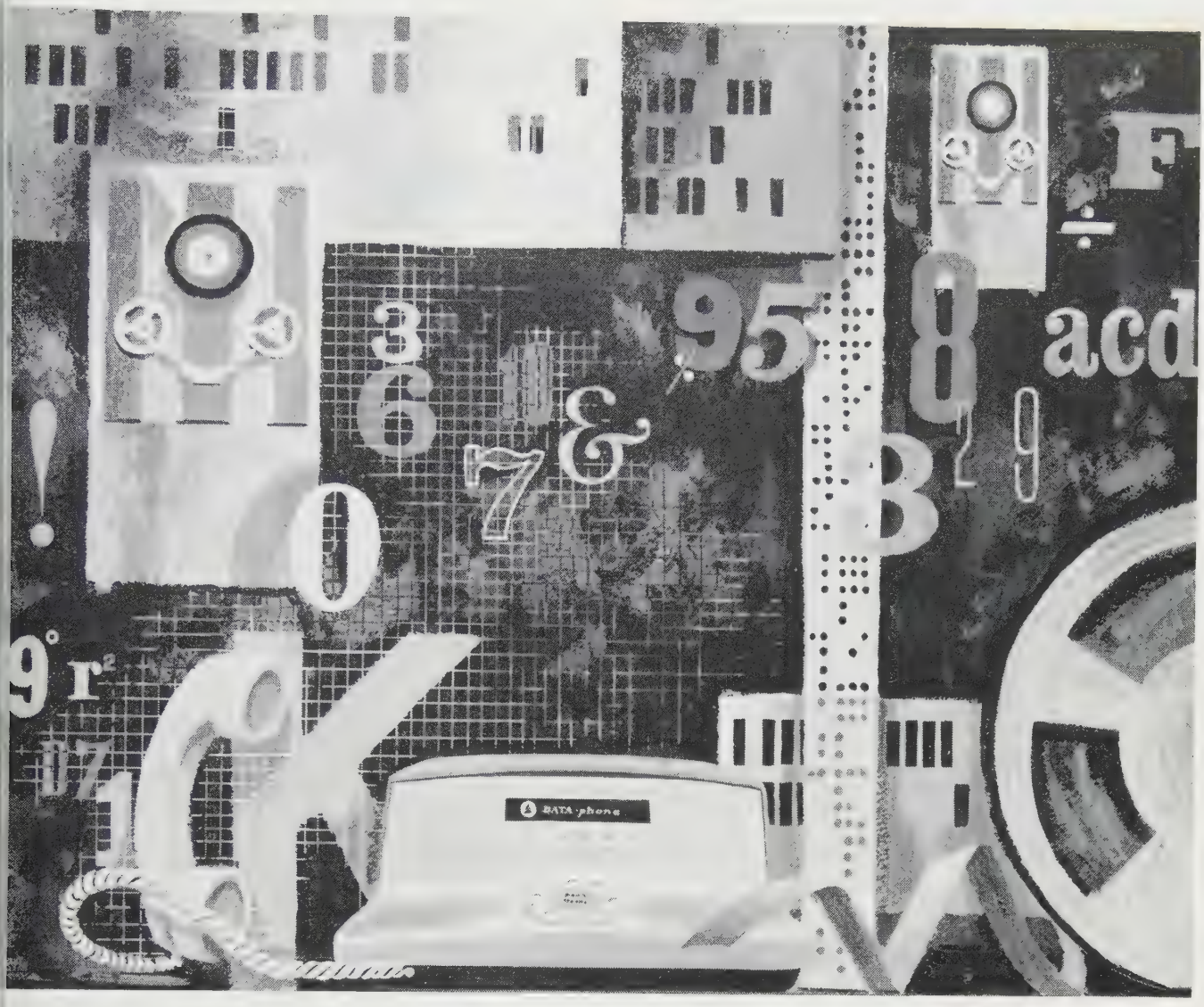

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Tau Beta Pi Pledge Essay . . .

HONG KONG and the BAMBOO CURTAIN

By Charles Liang

TECHNOGRAPH Again Presents a Typical TBP Pledge Essay . . .
The Type Every Engineer Entering the Honorary Fraternity Must Write

Hong Kong is a tiny island just off the southern coast of China. Its territory includes a small penisula which is separated from Communist China by a stream with a short wire fence on its northern bank. This fence has been known as the "Bamboo Curtain."

Hong Kong is a good example of moderness, efficiency, the benefits of international trade and intercourse, high civic standards, good administration, capitalistic progress, freedom from want, from fear. from prosecution, freedom of enterprise, of speech, of belief, of employment—boldly confronting, at the closest quarters, those who deny all these things It bears comparison in many practical respects with some western cities. Against the dark backgrounds of Asian poverty, corruption, uncertainty, and oppression, Hong Kong's example is even dazzling. It is a living disproof of Communist propaganda.

It is nevertheless unlikely that the Chinese communists will attack Hong Kong. One strong reason for this is that they know they could in no way emulate —much less surpass—the practical and social achievements of the place in its colonial era. A second reason is that the seizure would probably mean war, and certainly the final cutting off of China from the rest of the world. The Chinese will have another dead city on their hands, even deader than Shanghai. Hong Kong is also of "Life-line" importance to the great overseas Chinese communities of Asia, who must not be left out of account.

Hong Kong has a pivotal position, in every respect of human relations, not only for China but for all of Asia and the world. Even before the war, Hong Kong's activities were expanding on world-wide lines. There is no country in the world with which Hong Kong does not have trade connections. From this point of view, much of Hong Kong's business is international, China is a sideline—though always an important one.

One of Hong Kong's principal trading areas is Southeast Asia; any general stoppage of Hong Kong's activities would react very sharply on the livelihood and progress pattern of any Southeast Asian country. That region is now a key defense zone for the Western world. The view is widely held that a really decisive battle must be fought, and is already engaged—the battle for economic and social improvement, which must be carried on with "depth." If this front is not fully sustained, the whole hemisphere, indispensible to the Western defense resources, must pass to the Communists.

Hong Kong is not just a point on the coast of China, but an important component in the east Asian structure. In the Southeast Asian communities there is wide agreement that it is strategically and politically disastrous to extend the conflict at present, to fail to develop Southern Asia, and to identify the democratic cause with regimes which locally command neither trust nor respect. In the British view in partaicular, Southeast Asia is of primary importance, and Hong Kong is important, not merely as an entryway into China, but as part of Southeast Asia.

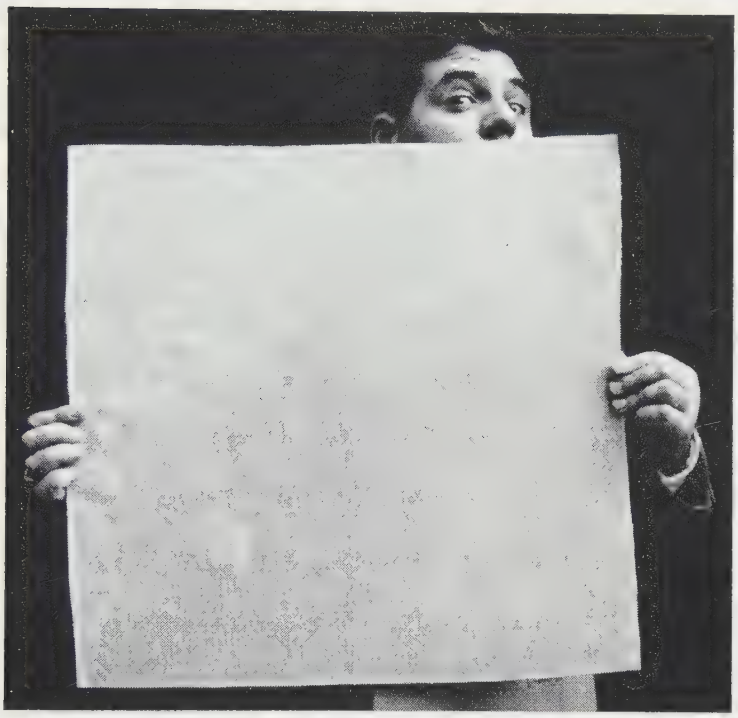
It is, however, not a question of trade alone. Hong Kong is the largest banking center in the Far East. It has the region's best harbor, and naval base, excellently equipped for the handling and repair of merchantships or warships. It is the center of insurance business for the whole Western Pacific. It has the world's third largest international airport (exceeded in traffic density and number of passengers carried only by New York and London). It is now, for 500 million Chinese, the only remaining window looking out on the free world.

In recent years, Hong Kong has become quite a manufacturing center. In British policy its role in this respect is especially appreciated, for the colon a useful provider of "incentive goods those cheap consumer goods with which the South Asian producers unwilling to expand their out-put. S of Hong Kong's industries are modern in their equipments and id notably the textile industry, which some of the most up-to-date plants in world. Others are merely cottage wo shops. About sixty distinct major ind tries may be distinguished; to men a few outstanding items, there are ton spinning, enamel ware, vacu flasks, flashlights, paint and lacquer, a modern plastic industry. The t production is about $120 million a and plays an important role in stock the shops in Southern Asia. In all th respects, Hong Kong is one of the lin pins of Far East economic structure.

How do the people in Hong K react to the ever present shadow of c munism? Outwardly and visible supp for the communist regime has princi ly come in Hong Kong not enti from the working class, as people in West may imagine, but rather from tain types of merchants, exponents the carpetbagger technique, who h done rather well from trading with communists. The working people Hong Kong are fully aware that t brethren across the border are wor and disciplined as never before. In 19 50, the streets of Hong Kong and K loon (peninsula) were ablaze w bright new communist flags. There been no change in the regulations mitting any such display, but by the of 1955, few such flags were seen, those still visible were looking old dirty. Today, it is necessary to cond a considerable search to locate even of these emblems, so rapidly has the star waned.

It is perhaps misleading to conc on this high moral note, which is altogether representative of the H Kong outlook. However, in recent ye large amounts of capital, especially f the hopeful American investors, poured into Hong Kong. These inv ments are concentrated both on in tries as well as on the booming to trade. One may observe that new b ings are coming up everywhere in already over-crowded city. The pe in Hong Kong are confident tha will continue to prosper under the p ent circumstance. Politically, they not worried either for they have l too long under communist pressur realize it. It is utterly amazing that tiny isle is able to give the rest of world such a contrasting image of conditions behind the "Bam Curtain."

Our new plastic stops a 30-cal. bullet cold (he hopes)



That plastic sheet is a scant 5/8" ick. But it'll stop a bullet in its acks. Splaaaat.

Our model is actually one of the ventors, John J. Aclin. He knows s infallibly bulletproof (but still nds the concept a bit hard to lieve). It does work. Really. And e plastic scales in at 1/7 the weight steel.

In addition to our bullet-stopping astic, we're working on quite a few her "unbelievable" projects.

Like converting common clay into umina (already a laboratory reality, w in the pilot plant stage).

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John Gannon, CE '62

DR. WATTENBERG'S BOTTLE

An Interesting Highlight on One of the Most Important Days in This Century . . . The Day of the First Sustained Nuclear Reaction

Perhaps the most important scientific event of this century was the first self-sustained nuclear reaction. This was accomplished in an atomic pile built by the Metallurgical Laboratory in the West Stands of Stagg Field at the University of Chicago. The first pile has special significance to the students at the University of Illinois because Dr. A. Wattenberg, a research physicist here was a member of the staff of the Metallurgical Laboratory. The Chianti bottle pictured with Dr. Wattenberg is one of the principal remaining mementos of the original pile, which has now been demolished.

Dr. Wattenberg came to the University of Illinois in 1958 to activate a group which would do research in energy physics. He had been at the M allurgical Laboratory, which bec Argonne Laboratory, from 1942 1950 at which time he went to M At both of these laboratories and at nois, he has investigated elementary "strange" particles. While at MIT was active in building high energy

Dr. Wattenberg, right, shows the Chianti bottle to John Gannon. This bottle has been requested for a commemorative exhibit by Argonne Laboratory

accelerators as an aid to his re-
h. Although Dr. Wattenberg has
cipated in many projects since the
pile, (Chicago Pile I), he consid-
his contribution to the Metallurgi-
Laboratory his most important work
s effect on people.

he Metallurgical Laboratory, at the
versity of Chicago, was under the
rvision of Dr. Enrico Fermi, one of
world's greatest scientific minds. It
Dr. Fermi's early experiments that
ed the whole business of energy-pro-
ng nuclear reactions. The reaction
h was induced in the pile at the
versity of Chicago and which takes
in an atomic bomb is fission. Essen-
it is the splitting of uranium
s. Fission is induced by the bom-
ment of uranium with slow neu-
s. As early as 1934 Dr. Fermi had
n experimenting with slow neutron
bardment of this element. The ef-
was the production of a new ele-
, plutonium, and a then undefin-
residue.

wasn't until 1939 that chemists
vered the identity of the residue.
uranium atoms had split in two
yielding barium and other atom-
similar elements. But the total
ht of the two parts didn't equal the
ht of the original uranium atom; it
less. According to Einstein's law re-
g mass to energy: $E=mc^2$ (Energy
ls the product of the lost mass and
quare of the speed of light) this re-
n was a source of tremendous en-
Dr. Fermi immediately envisioned
lf-sustained nuclear reaction, one
would continue to produce the fis-
reaction after it had been artifically
ated. This is possible since the fis-
reaction causes emission of neutrons
h will bombard other uranium
s. Dr. Fermi started experimenting
diately at Columbia University to-
l the end of a self-sustained nuclear
ion. After a few months Dr. Fermi
ded to expand his group. Dr. Wat-
erg, then a student of Dr. Fermi's
asked to join. Dr. Wattenberg ac-
d the invitation with some reserva-
since he felt that the possibility of
ss was rather small.

r. Fermi explained to all those
n he asked to join the intent and
e of the work. The explanation was
rtant because the experiments had
me secret and these men would be
ng to develop the atomic bomb.

conjunction with the experiments
conducted at Columbia under Dr.
i's guidance, a group at Princeton
conducting similar experiments.
in 1941 the project was reorgan-
and both groups were moved to
University of Chicago. Thus was
ed Dr. Fermi's famous Metallurgi-
Laboratory. The work progessed in secrecy, and on December 2, 1942 the first self-sustained nuclear reaction was achieved.

Success was apparent at 3:53 P. M.; needless to say the members of the staff were elated. After the experiment was obviously successful Dr. Fermi ordered the pile (current literature refers to them as reactors) shut down, and Prof. Eugene Wigner, himself a well-known scientist, produced a bottle of Chianti to drink to the achieved success. After the bottle was empty most of those present wrote their names on it. The guards at the Metallurgical Laboratory kept a list of all those admitted to the West Stands, but Dr. Wattenberg doesn't know whether the guard's papers are still in existence. If they aren't, the bottle is the only record of those present to witness the first successful self-sustained nuclear reaction.

The Chianti bottle that hung in the Metallurgical Laboratory where Dr. Fermi's group worked. Notice Dr. Fermi's signature—E. Fermi—and the date of the experiment's success—December 2, 1942.

The original work with the fission reaction was hazardous for the experimenters; they knew little of the reaction and what could be expected. The hazard was the possibility of a careless exposure to excessive radiation. By the time the project was moved to Chicago, the experimenters knew what to expect from the fission reaction and could protect themselves against exposure to excessive radiation. But the experimenters had never seen a self-sustained nuclear reaction until December 2, 1942. After the facts of the first pile came to print some people decided that the experimenters didn't know for sure that the first pile and the first atomic bomb couldn't "take-off," split all the atoms on the surface of this planet, and create a sun out of the Earth.

Dr. Wattenberg replys that the experimenters were sure that this couldn't happen. As the work progressed the results were checked and rechecked. Some extrapolation was necessary from one step to the next, but that extrapolation was minute. Fission was extremely difficult to induce even in the atom with the greatest propensity to fission, uranium. Consequently the members of the Metallurgical Laboratory were confident that neither the first pile nor the first atom bomb would get out of hand.

The Metallurgical Laboratory symbolizes the advent of nuclear power and nuclear warfare; thus its importance doesn't have to be stressed. This raises the question, did its members consider the possible consequences of their work? According to Dr. Wattenberg the staff was aware of the consequences; they knew that they were contributing to the production of the atomic bomb. There was dissension among them concerning the ethics of atomic bombs and atomic bombing. Some were of the opinion, as was Dr. Wattenberg, that the atomic bomb should be built but not used. All however were aware that the Germans were conducting similar experiments, and many were afraid that the Germans were ahead. Dr. Wattenberg, and those who shared his opinion, felt that the best insurance against nuclear attack was the potential for nuclear counter-attack.

(Continued on Page 27, Col. 1)

RUSSIA . . .

(Continued from Page 12)

screwed the back of the watch to have a look at the interior mechanism. No part would move. The manager's statement that their watches had as good a workmanship as any elsewhere must be at least a slight exaggeration.

PRIORITY PRODUCTS

The poor workmanship of some of their goods such as their watches and public housing is in striking contrast with their apparent skill in other fields, such as the missile industry, and it illustrates the system of priorities. Soviet planned economy says that important projects of national or military significance such as steel mills, power plants, or missiles get the top grade materials and skilled labor from the limited supply. The low priority projects get what is left. Most of the items for everyday use by the people are low priority and thus are inferior to those of Western Europe.

For example, clothes are poorly made. Apparently only a few common sizes of clothing are available for many people wore clothes which did not quite fit. The same limited selection meant that there was no style; any type of clothing or combination was okay. Women wore argyle socks with high heeled shoes. Everyday items such as toothpaste were different in quality from that in Western Europe. I bought a tube of "chlorophyll" toothpaste in which the paste was very grainy and didn't foam at all.

In many consumer industries there seems to be a tendency to imitate products abroad. rather than create original designs. For example. the Zim resembles a prewar Buick. According to Irving R. Levine in his interesting book, *Main Street, USSR,* there may be several reasons for this. One is that a new idea must work its way up through the particular ministry or economic council for approval. Also, the reward is small; very seldom does an inventor get more than a flat and final sum of $600. The explanation is that it is the duty of every citizen to use his creative talents for the good of the state, whether he is paid for it or not.

Another reason for the lack of creativity may be the quota system. This schedule of the planned national economy extends all the way down to the individual worker. The five or seven-year plan maps out production and each factory and worker is given a number of units to be produced in a given time. This quota is either met and exceeded or there is trouble. Consequently, the aim is quantity, and quality is often sacrificed. Old and tried methods are used. The factory leaders are hesitant to introduce new and untried methods because of the possibility of "bugs" in the new system.

The government seems to recognize that things aren't as good as they should be. Our Intourist guide told me one day, "Sure your standard of living is higher than ours now. but give us a few years." Until this time comes, though, good quality goods will be scarce or non-existent. Since there is such a shortage of consumer goods, the economy probably can't afford to spend the time and money, and talent in creating original designs of consumer goods. It probably doesn't make much difference to them whether a product is original or copied. To make up for the hardships in the lack of some goods. the government erects giant public works that serve as a promise of things to come.

Such symbols are the Metro (subway) systems of Moscow and Leningrad. They serve as showplaces for the foreign visitors. Many stations have vaulted ceilings and walls with mosaic designs. Much marble and cut glass is used in the columns and arches. Each station has a unique decor. A station in Leningrad looks like the interior of a church with its long rows of ornate columns. At the end of the main aisle is a beautiful mosaic of Stalin (whether his picture is still there or not is an interesting question). Another station has mosaics showing friendship between the different Soviet Republics. One honors agricultural and another factory workers. Helene said, one afternoon as we were riding the Metro, "the subway belongs to the people. In the old days only a few could afford nice homes and the luxuries of life, but now the Metro can be enjoyed by all."

I've ridden on the Metro of Paris, the tube of London, the U-Bahn in Berlin, and the subway of Chicago, but none compared with the luxury of the Metro of either Moscow or Leningrad. With its trains clean and in good running order, it is a very fast and pleasant way to travel, except of course, during rush hours. One afternoon when we were going to GUM, Moscow's largest department store, we happened to get caught in the crowd. The train was about to pull out and the car was packed with people. Helene wanted us all to get on and instructed us to do so the best way we could. A couple of us held the doors open and we literally fought our way in. It seemed to be an acceptable practice.

The city's surface lines, though, are a different story. It took an hour to go from Revolution Square, which is near Red Square, to the hotel on the edge of the city, and the trip can be grinding on one's nerves. The buses are crowded and slow moving. An interesting feature of the buses is that the fare is paid on the "honor system." There is a collection box in which the correct change dropped. The rider then rips off his o ticket. I'd say that half the people did pay. Sometimes it pays to be hone though. One time a plain clothes "wo ers' representative" got on and check everybody to see if they had tickets.

RUSSIAN AIR TRAVEL

Soviet air travel seems to be on p with European air travel for lo flights. Most long-distance runs se to use versions of the TU-104 or T 114 jet bombers. My group flew in TU-104 from Leningrad to Mosco and other planes parked on the runw were similar to the one we used. C plane was up-to-date and we had smooth flight. We roared down the ru way at a terrific speed and once were airborne, we went into a v steep climb. It took us about an hour go the 400 miles to Moscow. Accord to an announcement by the steward we flew at a speed of 860 kilomet per hour (515 mph) at an altitude 8000 meters (about 25,400 feet. Si there was no public address system the plane as there are on planes e where, the stewardess told us when fasten our safety belts and other structions. We were not allowed take pictures from the plane.

A FINAL ANALYSIS

I must say, Russia is more advan technologically than I had thou From what I've read, it seems all people lived at a subsistence level, w all the productive forces went into development of heavy industry armament. This may be true to s extent, but the people appear to h adequate access to the goods neces for life above the subsistence level. least this was true in Moscow and L ingrad, which are undoubtedly the sh places of the USSR.

Their building and productive t niques in some areas are crude by or West European standards becaus the lack of quality or artistic taste. Soviets maintain, though, that they l great shortages in some areas and more concerned with function and ume production rather than with q ity or taste. Before the revolution, Russians had nothing, they say, and the people want a first class standar living as soon as possible. The pla economy is the best way to achieve result, they think. So most of the ductive capacity is directed to the b ing of flats, the steel industry, and p plants. The less important consu goods, like food, clothes and toothp will come later.

The Russians have shown great nological capability in their missile gram. Since this is considered to b

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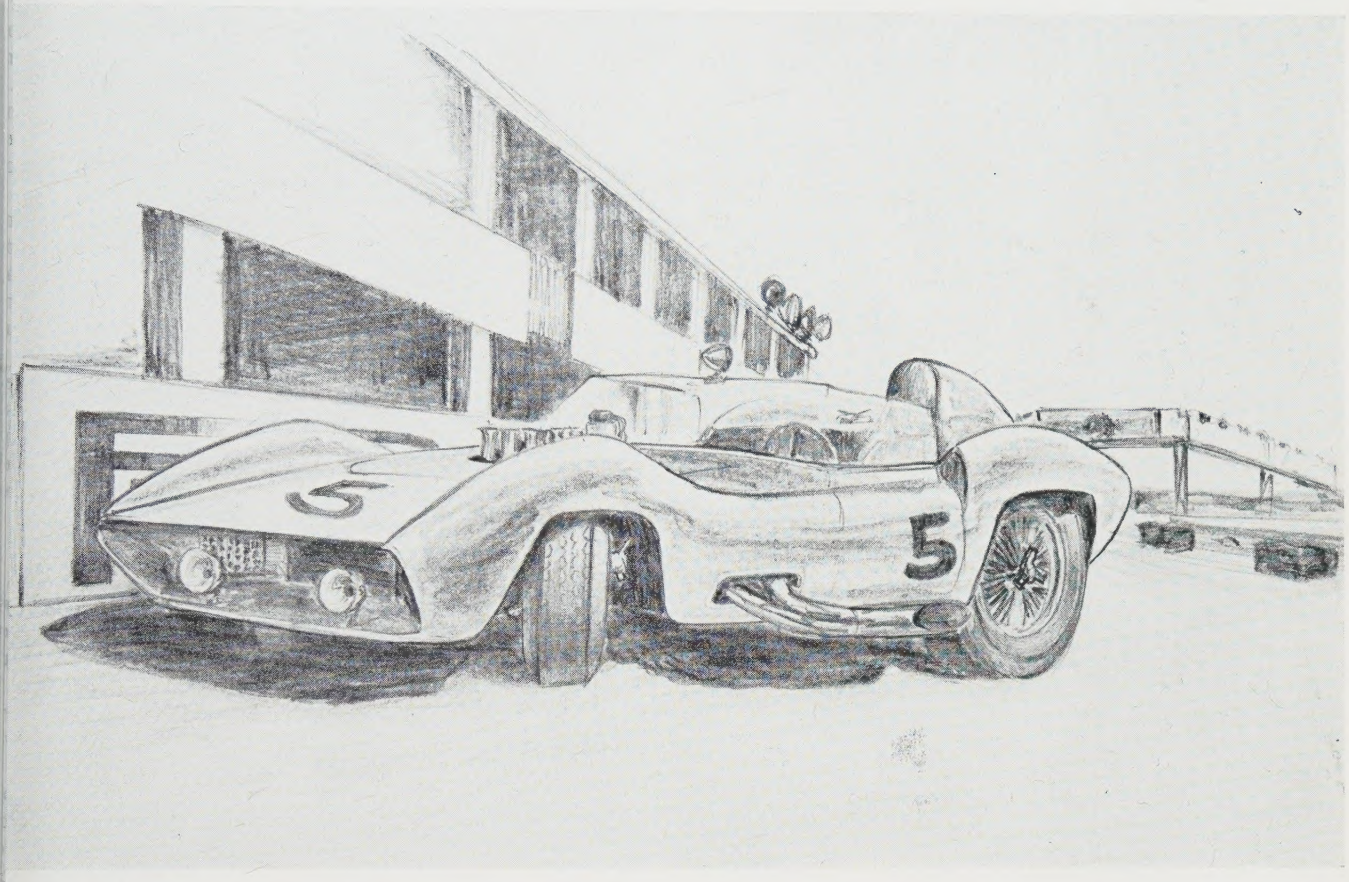
Culleton's Corner....

By Carson Culleton



This month's goodie is an all-out competition machine. 327 inch Chev (in finest form) fills its lungs with the d of an organized leak, fuel injection. The injector ram ibes and a magneto peek through the hood proclaiming mitless power. The tube frame boasts a mere 100 inch heelbase that would fit anyone's garage. Balanced handling makes this goer run on the tightest track. Near-centerline steering allows one to handle this machine with the ease of power steering and the quickness of a cycle. Those tires are guaranteed to 175 mph.

Don't fail to miss the Corner next month. Carson will present his New Year's Resolution in automobiles.

LE . . .

(Continued from Page 25)

ne staff members felt that an at- bombing would shorten the war thus save lives, American lives. scientists were in favor of the sed nuclear attack on Japan. Oth- eren't. Leo Szilard speaking for tter group tried to prevail upon lent Roosevelt, through Secretary ate Burns, to refrain from bomb- apan. Through all of this Dr. Fer- ithheld comment; he always tried to keep political matters separate from his work.

After December 2, 1942 members of the group went to other laboratories where they were desperately needed; some went to Los Alamos to work on the atomic bomb; others went to the Oak Ridge and Hanford nuclear laboratories. Six of the original staff, including Dr. Wattenberg, remained at the Metallurgical Laboratory. At the laboratory Dr. Zinn, an important contributor to the first pile, directed the development of the world's first heavy-water reactor. The Metallurgical Laboratory also did research assisting other laboatories and assisting in the design of new piles.

In February of 1943, Dr. Wattenberg was placed in charge of dismantling the first pile and moving it to the Argonne Forest of Palos Park, Illinois. It was buried in the Argonne Forest in 1954. The Chianti bottle hung in the laboratory until the string broke; Dr. Wattenberg picked it up and took care of it.

The first pile is gone; all that remains of that fateful experiment are some graphite bricks used in the pile, a few pen recordings, Dr. Wattenberg's bottle, and some recollections.

One of a series . . .

Interview with General Electric's Dr. J. H. Hollomon

Manager—General Engineering Laboratory

Society Has New Needs and Wants—Plan Your Career Accordingly

DR. HOLLOMON is responsible for General Electric's centralized, advanced engineering activities. He is also an adjunct professor of metallurgy at RPI, serves in advisory posts for four universities, and is a member of the Technical Assistance panel of President Kennedy's Scientific Advisory Committee. Long interested in emphasizing new areas of opportunity for engineers and scientists, the following highlights some of Dr. Hollomon's opinions.

Q. Dr. Hollomon, what characterizes the new needs and wants of society?

A. There are four significant changes in recent times that characterize these needs and wants.

1. The increases in the number of people who live in cities: the accompanying need is for adequate control of air pollution, elimination of transportation bottlenecks, slum clearance, and adequate water resources.

2. The shift in our economy from agriculture and manufacturing to "services": today less than half our working population produces the food and goods for the remainder. Education, health, and recreation are new needs. They require a new information technology to eliminate the drudgery of routine mental tasks as our electrical technology eliminated routine physical drudgery.

3. The continued need for national defense and for arms reduction: the majority of our technical resources is concerned with research and development for military purposes. But increasingly, we must look to new technical means for detection and control.

4. The arising expectations of the peoples of the newly developing nations: here the "haves" of our society must provide the industry and the tools for the "have-nots" of the new countries if they are to share the advantages of modern technology. It is now clearly recognized by all that Western technology is capable of furnishing the material goods of modern life to the billions of people of the world rather than only to the millions in the West.

We see in these new wants, prospects for General Electric's future growth and contribution.

Q. Could you give us some examples?

A. We are investigating techniques for the control and measurement of air and water pollution which will be applicable not only to cities, but to individual households. We have developed, for example, new methods of purifying salt water and specific techniques for determining impurities in polluted air. General Electric is increasing its international business by furnishing power generating and transportation equipment for Africa, South America, and Southern Asia.

We are looking for other products that would be helpful to these areas to develop their economy and to improve their way of life. We can develop new information systems, new ways of storing and retrieving information, or handling it in computers. We can design new devices that do some of the thinking functions of men, that will make education more effective and perhaps contribute substantially to reducing the cost of medical treatment. We can design new devices for more efficient "paper handling" in the service industries.

Q. If I want to be a part of this new activity, how should I plan my career?

A. First of all, recognize that the meeting of needs and wants of society with products and services is most important and satisfying work. Today this activity requires not only knowledge of science and technology but also of economics, sociology and the best of the past as learned from the liberal arts. To do the engineering involved requires, at least for young men, the most varied experience possible. This means working at a number of different jobs involving different science and technology and different products. This kind of experience for engineers is one of the best means of learning how to conceive and design —how to be able to meet the changing requirements of the times.

For scientists, look to those new fields in biology, biophysics, information, and power generation that afford the most challenge in understanding the world in which we live.

But above all else, the science explosion of the last several decades means that the tools you will use as an engineer or as a scientist and the knowledge involved will change during your lifetime. Thus, you must be in a position to continue your education, either on your own or in courses at universities or in special courses sponsored by the company for which you work.

Q. Does General Electric offer these advantages to a young scientist or engineer?

A. General Electric is a large diversified company in which young men have the opportunity of working on a variety of problems with experienced people at the forefront of science and technology. There are a number of laboratories where research and advanced development is and has been traditional. The Company offers incentives for graduate studies, as well as a number of educational programs with expert and experienced teachers. Talk to your placement officers and members of your faculty. I hope you will plan to meet our representative when he visits the campus.

A recent address by Dr. Hollomon entitled "Engineering's Great Challenge — the 1960's," will be of interest to most Juniors, Seniors, and Graduate Students. It's available by addressing your request to: Dr. J. H. Hollomon, Section 699-2, General Electric Company, Schenectady 5, N.Y.

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All applicants will receive consideration for employment without regard to race, creed, color, or national origin.